

West Virginia University  
NSG-533

UNPUBLISHED PRELIMINARY DATA

NASA PROGRESS REPORT 3/31/65

Effect of Endocrines on Osteoporosis of Disuse

A. Summary of experiments and investigations to date.

1. Hypophysectomy and Adrenalectomy in the rat.

In our previous progress report we stated that in control and experimental rats whose sciatic and femoral nerves had been sectioned we found a significant difference in total bone weight and force necessary to break the bones between intact and "denervated" femurs. When we compared the per cent differences of the values for control with the per cent differences in the experimental groups there was no significant difference.

2. Parathyroidectomy.

The procedure used was the same as that in the previous experiments. In control and experimental rats we found a significant difference in total bone weight and force necessary to break the bones between intact and "denervated" femurs. In addition there was a significant difference in the per cent differences in control and experimental groups in total weight but not in breaking weight. Expressing our results as "denervated" femur over normal femur ( $\frac{P}{N}$ ) in both control and parathyroidectomized animals the  $\frac{P}{N}$  value was significantly greater in the parathyroidectomized animal.

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(PAGES)  
CR 62539  
(NASA CR OR TMX OR AD NUMBER)

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None  
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### 3. Thyroidectomy.

A study was run on a group of rats to see what effect thyroidectomy had on osteoporosis of disuse. The thyroid gland was removed and the parathyroid dissected out and transplanted back into the animal. There was a wide variation in results obtained. This may be due to the fact that in some of these animals the transplants were successful and in some they were not. The results were inconclusive.

### 4. Treatment with sex hormones.

We attempted to repeat some of the work of Gillespie in which injections of estradiol and testosterone were administered to the rat during the period of time following nerve section until sacrifice. We were unable to confirm Gillespie's finding of a significant difference in the differences between control and hormone treated animals.

### B. Evaluation of findings to date.

1. There is a decrease in the degree of bone atrophy in femurs from parathyroidectomized rats compared with controls. This would suggest that the parathyroid is involved in the resorption of bone in osteoporosis of disuse. This evidence is in agreement with data obtained from metabolic studies done by Carlson and Thornton.
2. We observed no effect on osteoporosis of disuse with the administration of sex hormones. The rats we used were several months older than those used by Gillespie. The difference in the response to this treatment may be due to the age difference.

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- 1) Thornton, P. A. and L. Carlson. Proc. Soc. Exp. Biol. & Med. 114: 347, 1963.
  - 2) Gillespie, J. A. J. Endocrinol. 11: 66, 1954.

C. Objectives of research to be conducted for the balance of the period of the grant.

1. Work with the hypothyroid rats will be continued.

2. Experiments will be conducted to determine whether or not age is a factor in sex hormone administration in the rat.

D. Plans for publication of results.

A publication should be ready by the end of the semester.

E. Possibilities for expansion of project.

The department of Theoretical and Applied Mechanics is in the process of devising a sensitive method to measure stress and strain in rat bones. In our future experiments we will be able to obtain stress-strain curves which will give us more accurate data on these properties of bone than we can presently secure.

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Dr. Hugh A. Lindsay

T. Robert Bullard

Department of Physiology

West Virginia University Medical Center.

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March 15, 1965